Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (original) **A method** for diagnosing operation of a nonthermal plasma discharge device disposed in the exhaust of an internal combustion engine, comprising:

reducing power to the nonthermal plasma discharge device wherein said engine exhaust has a lean NOx trap disposed downstream of the nonthermal plasma discharge device; and

determining that said nonthermal plasma discharge device is operating properly when a concentration of NOx of exhaust gases exiting said lean NOx trap increases in response to reducing power to the nonthermal plasma discharge device.

2. (original) The method of claim 1 wherein said diagnostic procedure is conducted shortly following a purge cycle of said lean NOx trap.

3. (original) The method of claim 1, further comprising:

decreasing power to said nonthermal plasma discharge device when a concentration of NOx of exhaust gases exiting said lean NOx trap remains substantially constant in response to reducing power to the nonthermal plasma discharge device.

4. (original) The method of claim 3, further comprising

determining that said nonthermal plasma discharge device is not operating when power supplied to said nonthermal plasma discharge device is nearly zero.

5. (original) The method of claim 1 wherein said concentration of NOx is detected by a NOx sensor located in the engine exhaust downstream of said lean NOx trap.

6. (original) The method of claim 1 wherein said power supply to the nonthermal plasma discharge device prior to said reducing power is determined by a nonthermal plasma discharge device operating model.

7. (original) The method of claim 6, further comprising: updating said operating model when said reduction in power to the nonthermal plasma discharge device causes no substantial decrease in NOx concentration of exhaust gases exiting said lean NOx trap.

8. (original) The method of claim 6 wherein said operating model provides a computation of fuel and electrical energy to supply to the nonthermal plasma discharge device based on an engine operating parameter.

9. (original) The method of claim 8 wherein said engine operating parameter comprises at least one of: engine speed, torque, mass airflow, throttle position, air-fuel ratio, air temperature, and engine coolant temperature.

10. (original) **A method** for diagnosing operation of a nonthermal plasma discharge device disposed in the exhaust of an internal combustion engine, comprising:

reducing fuel supply to the nonthermal plasma discharge device wherein said engine exhaust has a lean NOx trap disposed downstream of the nonthermal plasma discharge device; and

determining that said nonthermal plasma discharge device is operating properly when a concentration of NOx of exhaust gases exiting said lean NOx trap increases in response to reducing fuel supply to the nonthermal plasma discharge device.

11. (currently amended) The method of claim 10 wherein said diagnostic procedure is conducted shortly following a purge cycle of said lean NOx trap.

12. (currently amended) The method of claim 10, further comprising:

decreasing fuel supply to said nonthermal plasma discharge device when a concentration of NOx of exhaust gases exiting said lean NOx trap remains substantially constant in response to reducing fuel supply to the nonthermal plasma discharge device.

13. (original) The method of claim 12, further comprising

determining that said nonthermal plasma discharge device is not operating when fuel supplied to said nonthermal plasma discharge device is nearly zero.

14. (currently amended) The method of claim 10 wherein said concentration of NOx is detected by a NOx sensor located in the engine exhaust downstream of said lean NOx trap.

15. (original) The method of claim 10 wherein said power supply to the nonthermal plasma discharge device prior to said reducing power is determined by a nonthermal plasma discharge device operating model.

16. (original) The method of claim 15, further comprising: updating said operating model when said reduction in power to the nonthermal plasma discharge device causes no substantial decrease in NOx concentration of exhaust gases exiting said lean NOx trap.

17. (original) The method of claim 15 wherein said operating model provides a computation of fuel and electrical energy to supply to the nonthermal plasma discharge device based on an engine operating parameter.

18. (original) The method of claim 17 wherein said engine operating parameter is based on at least one of: engine speed, torque, mass airflow, throttle position, air-fuel ratio, air temperature, and engine coolant temperature.

19. (original) **A system** for diagnosing operation of an exhaust aftertreatment system of an internal combustion engine, comprising:

a nonthermal plasma discharge device disposed in the exhaust of the internal combustion engine;

a lean NOx trap disposed in the engine exhaust downstream of said nonthermal plasma discharge device;

a power supply coupled to said nonthermal plasma discharge device;

a fuel injector located upstream of said nonthermal plasma discharge device; and

an electronic control unit electronically coupled to the engine, said power supply, and said fuel injector, said electronic control unit reducing supply of an energy quantity to said nonthermal plasma discharge device and determining that said nonthermal plasma discharge device is operating properly when a concentration of NOx of exhaust gases exiting said lean NOx trap increases in response to reducing said energy quantity supply to the nonthermal plasma discharge device.

20. (original) The system of claim 19 wherein said energy quantity is a fuel quantity supplied by said fuel injector.

21. (original) The system of claim 19 where said energy quantity is an electrical energy supplied by said power supply.

22. (currently amended) The system of claim 19 wherein said electronic control unit further determines that said plasma discharge device is not operating properly when a concentration of NOx of exhaust gases exiting said lean NOx trap remains substantially constant in response to reducing said energy quantity supply.